Journal of Problem Solving

SPECIAL ISSUE

Editor's Introduction

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It was an honor to assemble the contributions to this special issue of the *Journal of Problem Solving*. This thematic issue contains seven papers tied together by an emphasis on explaining successful problem solving using a combination of experimental and correlational approaches. One reason why correlational or individual differences approaches are useful in conjunction with experimental studies is that they can provide insights into mechanism. While experimental manipulations may be useful for showing if problem solving can be facilitated, the exploration of differences in traits or behaviors of individuals who succeed or fail can help us start to understand the how and why behind successful problem solving. Indeed, experimental and differential approaches complement each other well, as Cronbach reminded us in his classic (1957) paper in *American Psychologist* titled "The two disciplines of scientific psychology," with his assertion that aptitude-by-treatment interactions not only exist, but that we can learn much from them.

The papers in this issue all go beyond simple tests of manipulations or simple effects of variations in stimuli that might affect problem solving behavior, to ask questions such as, for whom is a manipulation effective? Or, when or how are difficulties experienced? Similarly, this issue also incorporates the reporting of Bayes Factors for results in each of the articles which in its own way can be seen as another method that can help research to move beyond performing simple tests of manipulations, toward testing more explanatory models of behavior.

This issue contains seven papers. The first article, by Jarosz and Wiley, provides a nuts-and-bolts overview of how to compute Bayes Factors so that they might be more routinely included in research reports, particularly in the *Journal of Problem Solving*. The second paper, by Booth, Barbieri, Eyer, and Pare-Blagoev, offers an analysis of the difficulties that algebra students face in problem solving. The third paper, by Chesney and McNeil, continues to explore difficulties experienced in algebraic problem solving, particularly with regards to understanding the true meaning of the equals sign, and demonstrates the potential for negative transfer that can occur between arithmetic and algebraic thinking. The fourth paper, by Loehr, Fyfe, and Rittle-Johnson, also addresses the difficulties with understanding the equals sign, and demonstrates how engaging in an exploratory problem solving activity before receiving direct instruction can lead to better conceptual understanding of equivalence. As a set, these three papers reveal several difficulties that students may experience as they transition to algebra, and suggest some instructional activities that can help students to overcome these obstacles.

The next three papers also share some similarity to each other by exploring the effects of prior knowledge, interest, motivation and working memory capacity on problem solving. Although all of these constructs are generally presumed to help people to engage in more effective problem solving, each of these papers helps to document some conditions where the benefits of these constructs are limited, and even some conditions where the effects may be detrimental. The fifth paper by Ricks and Wiley considers whether prior knowledge or interest in the topic of story problems might facilitate statistical problem solving. However, if anything, interest in the topic of the story problems was found to lead to poorer problem solving performance. The sixth paper by Wieth and Burns shows that providing incentives to motivate students can also have negative effects. Finally, the paper by Van Stockum and De Caro reports an intriguing condition in which having more working memory capacity can actually impair performance on an insightful problem solving task.

I hope this special issue inspires future research on problem solving to take advantage of the insights that can be attained by using both experimental and individual differences approaches, but I also hope it encourages authors from either or both approaches to publish their research in the *Journal of Problem Solving*.

http://dx.doi.org/10.7771/1932-6246.1171